Critical Care Therapy and Respiratory Care Section

Category:	Clinical
Section:	Clinical Monitoring
Title:	Pulse Oximetry
Policy #:	07
Revised:	03/00

1.0 DESCRIPTION

1.1 Definition

1.1.1 A pulse oximeter is a completely noninvasive device for providing continuous measurement of arterial hemoglobin oxygen saturation and pulse rate that update with each heartbeat. The oximeter's lightweight sensors, designed for ease of use with various types of patients, allow noninvasive optical absorption measurements of pulsing arterial blood. The sensors take measurements by optical means alone. There is no heat source that may burn the patient. The light source consists of two light-emitting diodes operating at minimal power levels.

1.1.2 The pulse oximeter is a portable, bedside monitor that is electrically powered or battery operated.

1.1.3 The pulse oximeter conveys both audibly and visually the results of measurements of oxygen saturation and pulse rate; the two digital displays give a continuous readout. A qualitative indication of the strength of the pulse is represented by either a vertical light bar, known as a perfusion indicator, or a plethysmographic waveform, depending on the type of pulse oximeter utilized.

1.1.4 The pulse oximeter provides preset or manually set alarms for high and low oxygen saturations and heart rate.

1.1.5 The oximeter will not make a measurement unless patient perfusion is adequate to provide the data needed for accuracy. The perfusion indicator, the vertical light bar or plethysmograph, as described above, provides an indication of patient perfusion.

1.2 Goal of Pulse Oximetry

1.2.1 To rapidly verify, both audibly and visually, adequate patient oxygenation. Because the pulse and oxygen saturation can be updated with every heartbeat, there is an immediate indication of any hypoxemic event in which the patient desaturates.

1.3 Indications

1.3.1 All patients undergoing bronchoscopy or other invasive procedures which may compromise oxygenation.

1.3.2 All ventilator patients.

1.3.3 Any patient who appears hypoxic, who desaturates (becomes hypoxemic quickly) when changing position or being suctioned, or who has no recent arterial blood gas results available.

1.3.4 Patients who have low arterial PaO_2s as indicated by arterial blood gas.

1.3.5 Pediatric patients who are acutely ill and who cannot tolerate hypoxemic events.

1.3.6 Patients who do not have indwelling arterial catheters and who are at risk when arterial sticks are needed (i.e., low platelet count). Patients who would require multiple arterial blood gas samples to monitor oxygenation.

1.3.7 Patients who may require anesthesia for anxiety and/or pain control during invasive procedures.

1.3.8 A patient being transported with any of the above indications.

1.4 Hazards

1.4.1 Electrical precautions should be taken as with any electrically powered equipment. Do not immerse the pulse oximeters in water or any liquid solution.

1.4.2 Battery or fuse changes should only be performed by qualified personnel. Only the same type and rating of fuse must be used for replacement to minimize the risk of fire.

1.4.3 Cross-contamination of equipment can occur with reusable sensors if they are not properly disinfected.

1.5 Precautions

1.5.1 The pulse oximeter is calibrated to read arterial hemoglobin oxygen saturation of functional hemoglobin (saturation of hemoglobin functionally available for transporting oxygen in the arteries). Significant levels of dysfunctional hemoglobins such as carboxyhemo-globin or methemoglobin may affect the accuracy of the measurement.

1.5.2 The pulsatile saturation measurements are not reliable if a patient's perfusion is insufficient to supply data.

1.5.3 Cardiogreen dye and other intravascular dyes may, depending on concentration, affect the accuracy of the measurement.

1.5.4 Patient motion may affect sensor performance.

1.5.5 Some strong light sources such as bright sunlight, bright operating room lights, infrared heaters, and bilirubin lights may interfere with the measurement. If this occurs, cover sensor completely with opaque material such as a towel or blanket.

1.5.6 Lipid infusion can interfere with sensor measurement.

1.5.7 Patients at risk for skin sloughing and breakdown (i.e., post chemotherapy), should have the sensor site rotated at least every four hours. All other patients will require a site rotation once every 12 hours and as needed. Documentation of the site rotation in the MICU should be made in the "Respiratory Treatments and Comments" section of the Continuous Ventilation Record. All other documentation should occur in the MIS.

1.6 Adverse Reaction Interventions

1.6.1 If the oximetry values are outside safe limits (as determined by the physician), the physician should be notified and an arterial blood gas obtained.

2.0 EQUIPMENT AND MATERIALS

2.1 Pulse oximeter

2.2 Appropriate instrument cable

2.3 Oxisensors (Nellcor)

2.3.1 Durasensor (reusable transducer) digit

2.3.2 Adult digit (D-25)

2.3.3 Pediatric digit (D-20)

2.3.4 Infant digit (I-20)

2.3.5 Adult nasal (R-15)

2.3.6 Neonatal (N-25)

2.4 Criticare reusable sensor and tape

3.0 PROCEDURE

3.1 Verify physician's order for pulse oximeter.

3.2 Plug into a 120 volt AC electrical outlet.

3.3 Attach instrument cable by lining up dots on connector locks. DO NOT TWIST.

3.4 Connect appropriate sensor to instrument cable.

3.5 Apply the sensor to the patient. The index finger is the recommended site of application. Other sites include other fingers, a thumb, a toe, hand or a foot. Avoid extremities with catheters or blood pressure cuffs in place.

3.5.1 Peel the backing from the adhesive side of the sensor.

3.5.2 Press the cable end of the sensor onto the nail side of the digit, making sure that the alignment marker is centered on the nail.

3.5.3 Fold the sensor over the end of the digit. Align the other end of the sensor so that the two alignment marks are directly opposite each other.

3.5.4 Wrap the adhesive flaps around the digit.

3.6 Turn the instrument on. The instrument emits a "BEEP" and all LED displays light momentarily while the oximeter tests its circuitry. The ECG IN USE display illuminates if ECG synchronization is being used and an ECG signal is detected. After four to six pulses, the displays will show beat to beat information. There is an audible beep with each pulse; the pitch is proportional to saturation.

3.7 Set the high saturation limit at 100% and the low saturation limit at 90%, unless otherwise indicated. These are the limits which will produce an audible and a visible alarms when violated.

3.8 Change sensors at least every 12 hours and as needed. Disposable sensors may be reused for the same patient for as long as they are functional, unless grossly contaminated.

3.9 Make sure the power cord is interfaced with the oximeter and an electrical outlet, excluding during transport. "Battery in Use" is displayed when AC is not being supplied to the oximeter and the battery is discharging.

4.0 POST PROCEDURE

4.1 Clean the pulse oximeter, power cord, and nondisposable sensor with alcohol.

4.2 Replace the disposable sensor with a new one (Nellcor) or assure an adequate supply of sensor tape (Criticare) at the bedside.

5.0 CHARTING

5.1 Charting of bedside pulse oximetry is done on the Nursing Flow Sheet by the nursing staff in the 10D and 2J ICUs.

5.2 Charting of pulse oximetry values is done every with each ventilator check on the "Continuous Ventilator Flowsheet" for ventilated patients and on the "Comments" side of the form at least every 12 hours for nonventilated patients.
NOTE: Sensor site changes will be performed every 12 hours or more frequently if breakdown of skin is noted. All sensor sire changes will be documented on the back of the "Continuous Ventilator Flow Record" or in the MIS.

5.3 Charting of pulse oximetry values on general care floors will be entered in the MIS.

SIGNATURE:_____ DATE:_____
Assistant Section Chief, CCTRCS, CCMD

SIGNATURE:_____ DATE:_____
Section Chief, CCTRCS, CCMD

SIGNATURE:_____ DATE:_____
Medical Director, CCTRCS, CCMD

(Orig. 3/00)